

$$W = \sum_{i=1}^3 \sum_{j=1}^n \frac{\mu_j}{\alpha_j} (\lambda_i^{*\alpha_j} - 1) + K(J - 1 - \ln J)$$

$$\lambda_i = \frac{l_i}{l_{i0}}; \quad J = \lambda_1 \lambda_2 \lambda_3 = \frac{V}{V_0}; \quad \lambda_i^* = \lambda_i J^{-1/3}$$

$$\sigma_i = \sum_{j=1}^n \frac{\mu_j}{J} \left[\lambda_i^{*\alpha_j} - \sum_{k=1}^3 \frac{\lambda_k^{*\alpha_j}}{3} \right] + K \frac{J-1}{J}$$

110

$$f(\lambda_i) = \sum_{j=1}^n \mu_j \lambda_i^{*\alpha_j}$$

120

$$\sigma_{0i} = \frac{1}{\lambda_i} \left(f(\lambda_i) - \frac{1}{3} \sum_{k=1}^3 f(\lambda_k) + K \frac{J-1}{J} J \right)$$

$$\sigma_i = \frac{1}{J} \left(f(\lambda_i) - \frac{1}{3} \sum_{k=1}^3 f(\lambda_k) \right) + K \frac{J-1}{J}$$

130

FIG. 1

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$$\lambda_3 = \lambda_{longitudinal} = \lambda < 1$$

$$\lambda_1 \lambda_2 \lambda_3 = 1; \quad \lambda_1 = \lambda_2 = \frac{1}{\sqrt{\lambda_3}} = \lambda_3^{-1/2} = \lambda^{-1/2}$$

$$\sigma_0(\lambda) = \frac{1}{\lambda} \left(\frac{2}{3} f(\lambda) - \frac{2}{3} f(\lambda^{-1/2}) + K \frac{J-1}{J} J \right)$$

$$\varepsilon_0 = \lambda - 1;$$

$$p = K \frac{J-1}{J}$$

$$\sigma_0(\varepsilon_0) = \frac{1}{\lambda} \left(\frac{2}{3} f(\lambda) - \frac{2}{3} f(\lambda^{-1/2}) + pJ \right)$$

$$\frac{\lambda \sigma_0(\varepsilon_0)}{J} - p = \frac{1}{J} \left(\frac{2}{3} f(\lambda) - \frac{2}{3} f(\lambda^{-1/2}) \right)$$

220

$$\lambda \sigma_0(\varepsilon_0) = f(\lambda) - f(\lambda^{-1/2})$$

230

FIG. 2

$$\lambda \sigma_0(\lambda - 1) = f(\lambda) - f(\lambda^{-1/2})$$

$$\lambda^{-1/2} \sigma_0(\lambda^{-1/2} - 1) = f(\lambda^{-1/2}) - f(\lambda^{1/4})$$

$$\lambda^{1/4} \sigma_0(\lambda^{1/4} - 1) = f(\lambda^{1/4}) - f(\lambda^{-1/8})$$

....

$$f(\lambda) = \lambda \sigma_0(\lambda - 1) + \lambda^{-1/2} \sigma_0(\lambda^{-1/2} - 1) + \lambda^{1/4} \sigma_0(\lambda^{1/4} - 1) + \dots$$

310

$$\varepsilon_{0i} = \lambda_i - 1$$

$$f(\lambda_i) = \lambda_i \sigma_0(\varepsilon_{0i}) + \sum_{m=1}^{\infty} \lambda_i^{(-1/2)^m} \sigma_0(\lambda_i^{(-1/2)^m} - 1)$$

320

$$\sigma_{0i} = \frac{1}{\lambda_i} \left(f(\lambda_i) - \frac{1}{3} \sum_{k=1}^3 f(\lambda_k) + K \frac{J-1}{J} J \right)$$

$$\sigma_i = \frac{1}{J} \left(f(\lambda_i) - \frac{1}{3} \sum_{k=1}^3 f(\lambda_k) \right) + K \frac{J-1}{J}$$

330

FIG. 3

430

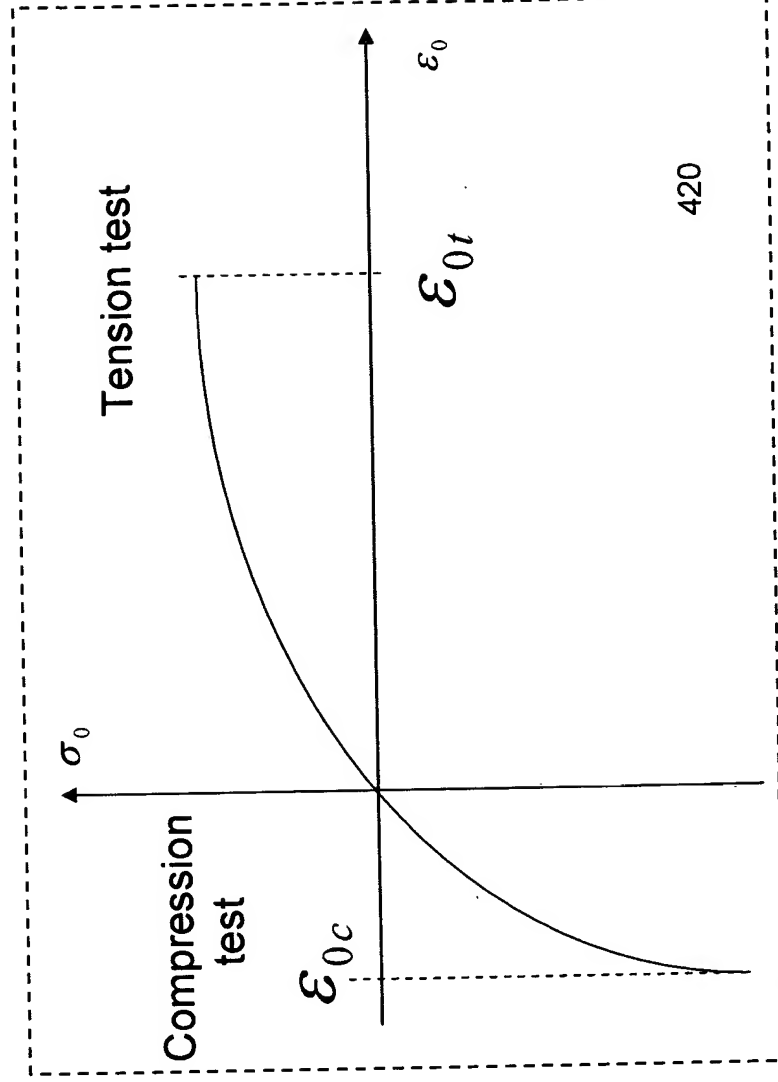
$$\varepsilon_{0 \min} = \min \left(\varepsilon_{0c}, \frac{1}{\sqrt{\varepsilon_{0t} + 1}} - 1 \right)$$

$$\varepsilon_{0 \max} = \max \left(\varepsilon_{0t}, \frac{1}{\sqrt{\varepsilon_{0c} + 1}} - 1 \right)$$

$$\varepsilon_0 = \lambda - 1$$

Typical strain range
from -0.8 to 1.2

FIG. 4



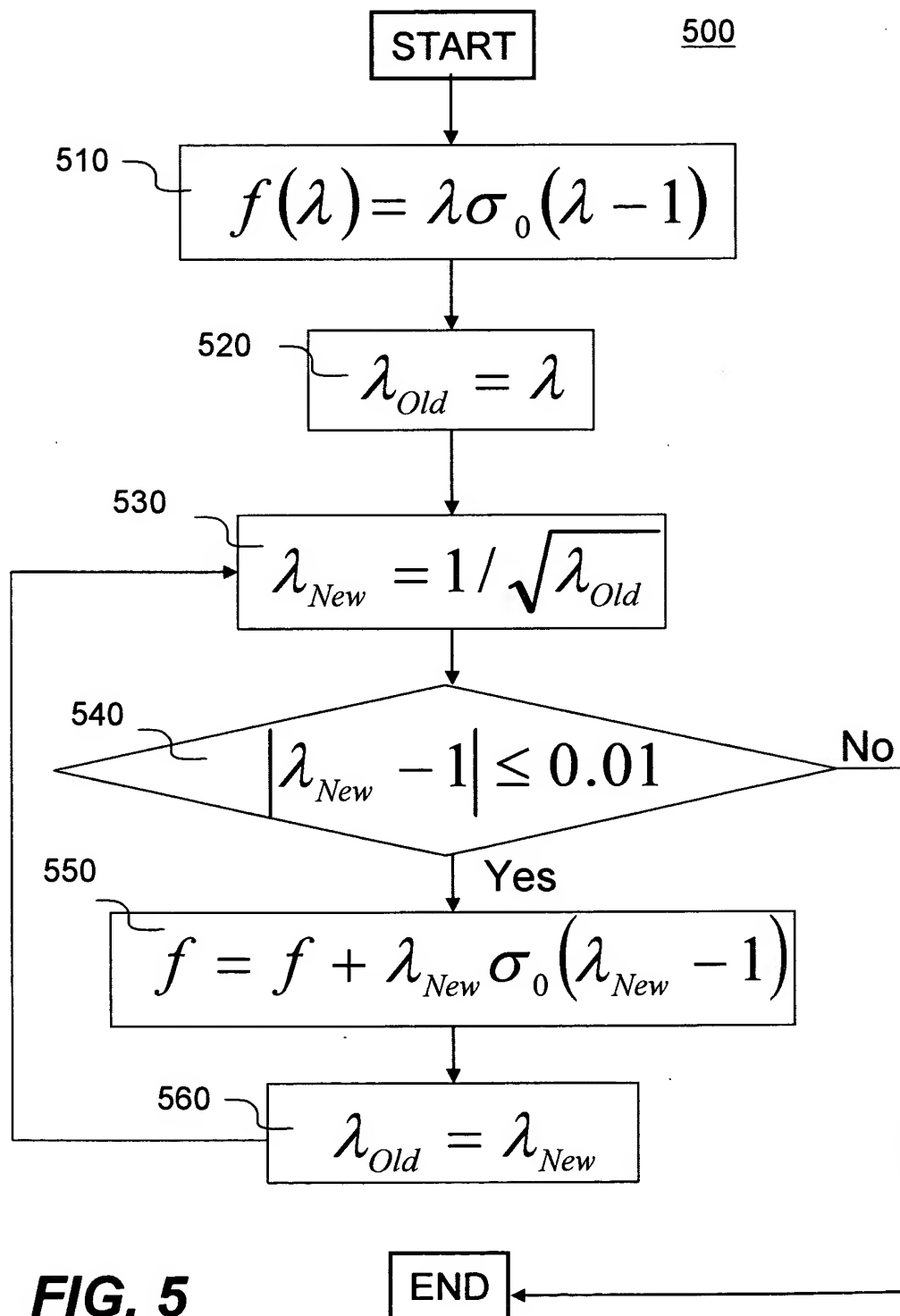


FIG. 5

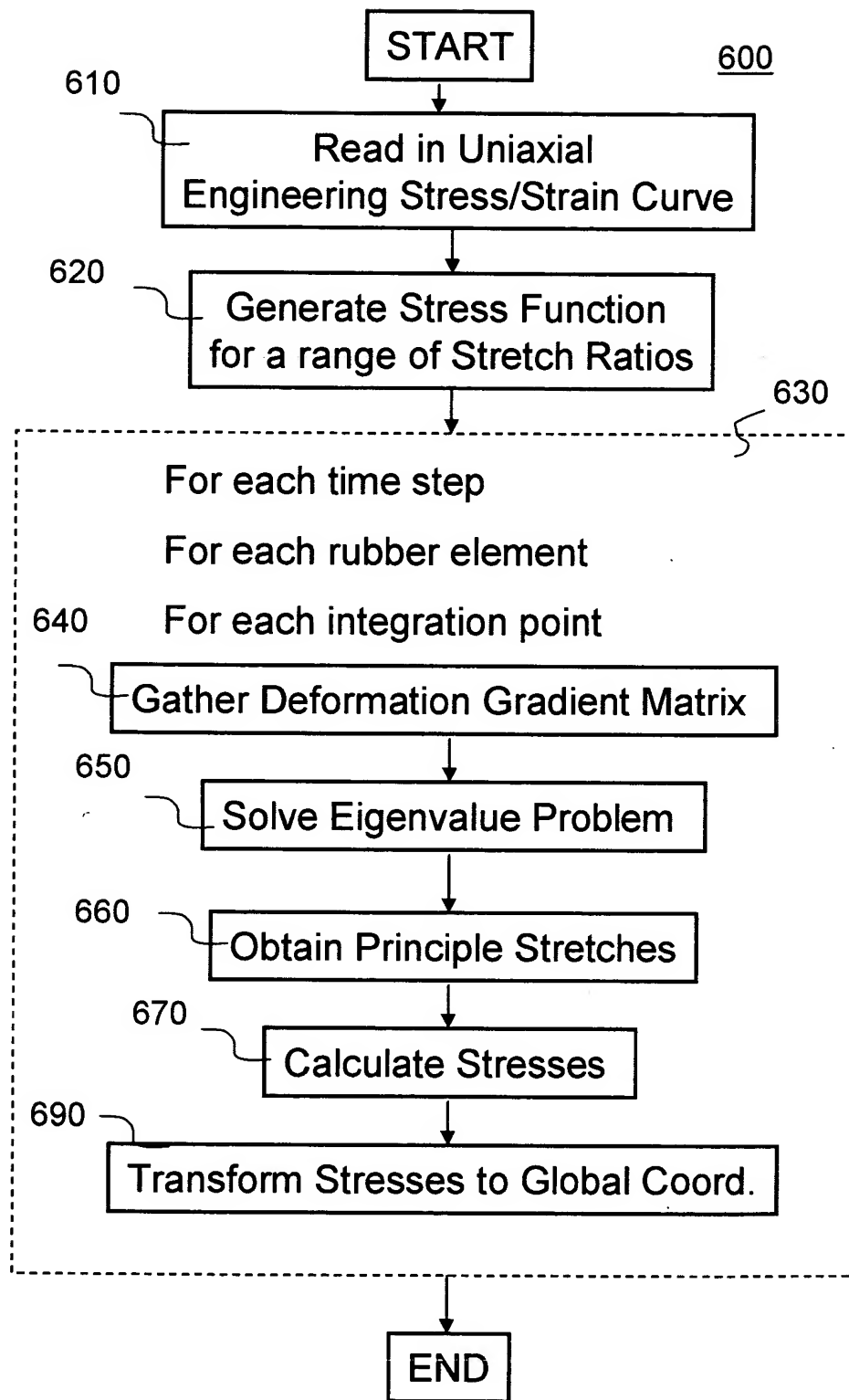


FIG. 6

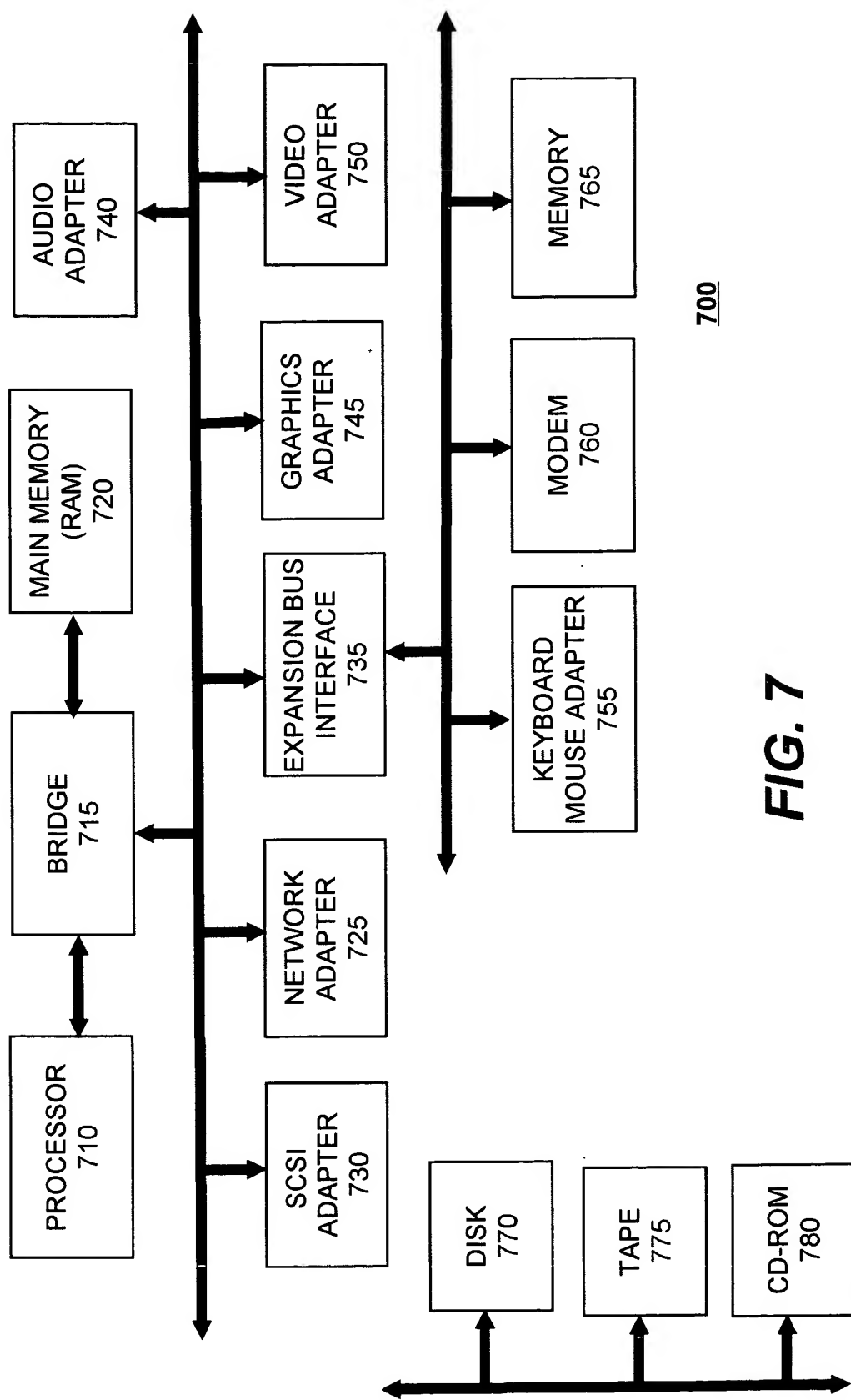


FIG. 7